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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,589	10/28/2003	James M. Tranquilla	741805-1010	5372

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EXAMINER

MCNELIS, KATHLEEN A

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/695,589

Applicant(s)

TRANQUILLA, JAMES M.

Examiner

Kathleen A. McNelis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2, 4, 6, 8, 22, 23, 29 and 30 is/are allowed.
- 6) ☒ Claim(s) 1, 3, 5, 7, 12-21, 24-28, 31, 32 and 34 is/are rejected.
- 7) ☒ Claim(s) 9-11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 16 Nov 2005.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 November 2005 has been entered.

Claims Status

Claims 1-32 and 34 remain for examination. Claim 33 was previously canceled.

Examiner's Comment

Claims 31 and 32 appear to have a typographical error. It has been assumed that the word "contain" should read "content".

DETAILED ACTION

Claim Objections

Claims 9 -11 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. Claims 9 and 11 are multiple dependent claims depending from multiple depending claims and claim 10 depends from claim 9. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3, 5, 7, 12-21, 24-28, 31, 32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Herden et al. (U.S. Pat. No. 5,659,110) in view of Doelling (U.S. Pat. No. 4,967,486):

Herden et al. discloses a process for purifying combustion exhaust gases wherein the gases contain mercury and mercury compounds. The mercury and mercury compounds are removed by cooling the exhaust gas and contacting with a mixture of zeolites containing clinoptilolite, montmorillonite and SiO₂ (abstract). Mercury is subsequently removed from the zeolites by treating the loaded zeolites with heated air as a fluidizing gas (col. 5 lines 57-67 and col. 7 lines 19-30). The process takes place in a reactor (25) wherein air is supplied at the bottom (27) for fluidization (unnumbered figure and col. 5 lines 57-67).

With respect to claims 1 and 34, Herden et al. discloses that mercury is removed from the zeolites by contacting the loaded zeolites with air as a fluidizing gas at a temperature of between 300 and 600 °C (col. 7 lines 19-25). The temperature range of

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between 300 and 600 °C overlaps with the claimed range of at least 357 °C. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a temperature of between 357 and 600 °C since Herden et al. teaches that mercury separation from the zeolite can be accomplished with a gas temperature between 300 and 600 °C.

Herden et al. does not disclose placing the mercury contaminated material in a microwave reactor.

Doelling discloses a microwave assisted fluidized bed processor comprising a fluidized bed vessel and microwave generating means for providing microwave energy into the fluidized bed vessel, where the fluidized bed vessel defines a microwave cavity enabling various reflected microwaves to be produced within the cavity (abstract). This cavity functions as the claimed microwave reactor. Doelling teaches that the advantage of using microwave energy with a fluidized reactor is that the microwave energy penetrates into the product to drive off moisture (an absorbed liquid phase) in the center toward the surface for evaporation into the fluidizing gas (col. 2 lines 1-8). As with Herden et al., the inlet gas or air is blown upwardly through the fluidized bed. This has been shown to substantially reduce drying time (col. 10 lines 35-45). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a microwave assisted fluidized bed process as taught by Doelling in the gas purification process of Herden et al. to benefit from the microwave penetration of the product to drive off absorbed liquid phase as taught by Doelling. Further, the process of Herden et al. is capable of being maintained continuously as in instant claim 34.

With respect to claim 3, Hedron et al. discloses treating the mixture laden with pollutants with air at a temperature of between 800 and 1300 °C (col. 7 lines 25-31), which is within the claimed range of at least 600 °C.

With respect to claims 5 and 7, Hedron et al. teaches that the mercury contaminated material enters reactor (25). The vapor phase is removed from the reactor (31) and the treated material is removed from the reactor (28). Fresh contaminated material is introduced to the reactor as stream 24 (col. 5 lines 30- col. 6 line 4). Hedron et al. does not specifically state that this is a continuous process as in claim 7, it is capable of being operated continuously. Further, making a process a continuous is prima facie obvious in the light of a batch process taught by prior art (see M.P.E.P. 2144.04 V E). Since depending claims 5 and 7 allow the embodiment of rejected claim 1, these are also rejected.

With respect to claim 12 (as depending from claims 1 or 3), the microwave reactor is a fluidized bed reactor vessel as described above regarding claims 1 and 3.

With respect to claims 13-18 (as depending from claims 1 or 3), Doelling teaches that the particular microwave generator used operated at a constant frequency of 2450 MHz (plus or minus 15 MHz) (col. 8 lines 41-65) which is within the claimed ranges of between 300 and 30 GHz (claims 13 and 16), 900 MHz and 3000 MHz (claims 14 and 17), 915 and 2450 MHz (claims 15 and 18).

With respect to claims 19-21 (as depending from claims 1 or 3), Doelling teaches that the power level is a result effective variable affecting drying time (col. 10 line 35 - col. 11 line 9). It would have been obvious to one of ordinary skill in the art at the time

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the invention was made to adjust the power inputs as result-effective variables to affect the mercury removal time (see M.P.E.P 2144.05, II, B).

With respect to claims 24-26 (as depending from claim 1), Herden et al. teaches that the fluidizing gas is air (col. 5 lines 57-60) as in instant claim 24. Doelling teaches that the fluidizing gas is air or nitrogen (col. 4 lines 1-19) as in instant claims 25-26.

With respect to claims 27 and 28 (as depending from claims 1 or 3), Herden et al. teaches that the sorption capacity for mercury may be increase to a maximum of 3% by weight (col. 6 lines 29-36). The range of up to 3% is within the claimed ranges of up to 50% (claim 27) and up to 28% (claim 28).

With respect to claims 31 and 32 (as depending from claim 1), Herden et al. in view of Doelling does not disclose the treated concentration of mercury in the regenerated zeolite, however since the process is substantially similar to the claimed process the same results would be expected.

Allowable Subject Matter

Claims 2, 4, 6, 8, 22-23 and 29-30 are allowed.

The following is an examiner's statement of reasons for allowance:

1. Herden et al. discloses a process for recovering mercury from a mercury contaminated material (a zeolite), using a fluidized bed reactor where fluidizing gas is introduced under the zeolite, but does not teach placing an additional carbon-free material into the reactor.
2. Doelling discloses a process for a microwave assisted fluidized bed processor but does not disclose placing a mercury contaminated material and an additional carbon-free material into the microwave assisted fluidized bed processor.

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3. In Herden et al. in view of Doelling, mercury is absorbed onto a zeolite and the zeolite is subsequently regenerated in a microwave reactor. Only the mercury contaminated material (zeolite) is disclosed, therefore Herden et al. in view of Doelling does not teach or suggest placing a carbon-free material into the microwave reactor in addition to the mercury contaminated material as in instant claims 2 and 4.
4. Sjostrom et al. (U.S. Pat. No. 5,948,143) discloses a process for removing mercury from a gas stream by absorption, and subsequent removal of the mercury by heating, but does not teach a fluidized bed method of mercury recovery or placing an additional carbon-free material into the microwave reactor.
5. JP 55076028¹ discloses a method of recovering heavy metals from plating sludge by heating with microwave power. Metals are recovered as a glassy melt. JP 55076028 does not disclose or suggest treatment or recovery of mercury.
6. JP 61060840¹ discloses a method to remove and recover mercury from waste materials including batteries and thermometers using microwave heating. JP 61060840 discloses a method that minimizes gas flow to minimize the amount of waste gas for treatment and therefore does not teach or suggest a fluidized bed method of mercury recovery.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

¹ Based on abstract and oral translation from USPTO translator.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ROY KING 
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700